MAE 2315: Fluid Dynamics
Fall 2014

Instructor: Fabrizio Vergine, Ph.D.

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Office Hours: Wednesday from 4:00PM to 5:00PM or by appointment

Section Information: MAE 2315-001. The course website is on the blackboard: https://elearn.uta.edu/

Time and Place of Class Meetings: Tuesday and Thursday from 9:30AM to 10:50AM. Room: WH 208

Description of Course Content: Introduction to Fluid Dynamics and low speed aerodynamics; fluid properties; dimensional analysis; conservation equations in integral and differential form; viscous flow; potential flow theory, air foil and finite wing theory. Prerequisites: C or better in each of the following, MAE 2323, MAE 3309 (or concurrent enrollment) or MAE 3310 (or concurrent enrollment), and MAE 3360 (or concurrent enrollment). The details of the course schedule are provided at the end of the syllabus.

Student Learning Outcomes: To study fundamental concepts of fluid statics, kinematics, and dynamics. To develop skills and techniques essential in analyzing and solving engineering problems involving fluid flows. To build up the basis for the analysis of more complex fluid flows.

Required Textbooks and Other Course Materials: Frank White, "Fluid Mechanics", 7th Edition, McGraw-Hill. ISBN: 978-0-07-352934-9.

Descriptions of major assignments and examinations: The grade will be calculated based on the outcome of homework assignments and exams.

Homework:
- Assigned during lectures
- Due the following week
- Must be handed in before the class starts
- No late homework is accepted

Exams:
- 2 midterms and 1 comprehensive final (3 exams total)
- Closed books/Closed notes
- Equation Sheet will be provided
- No graphing/programmable calculators
- Comprehensive final exam

Attendance: As per the University of Texas at Arlington policy, attendance at class meetings is not required. However, it is strongly encouraged for this course.

Grading:
- Homework: 10%
- Two midterms and one final exam: 30% each. 90% of the grade in total

The letter grades will be assigned based on the following criteria:

A: ≥90%,
B: ≥80% and < 90%,
C: ≥70% and <80%,
D: ≥60% and <70%,
F: <60%

IMPORTANT: students with a grade that is lower than C will have to repeat the course.

Make-up Exams: No makeup exams unless arrangements are made in advance and only for approved absences. No extra credit assignments will be given.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance**. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and

are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Course Schedule

Lecture #	Date	Description
1	08/21/2014	**Chapter 1:** Introduction to fluid dynamics and review of the fundamentals of the course prerequisites.
2	08/26/2014	
3	08/28/2014	**Chapter 2:** Derivation of the hydrostatic condition's formulation. Applications of hydrostatics: baromenter, manometer. Hydrostatic forces on plane surfaces. Buoyancy. Pressure distribution in rigid-body motion.
4	09/02/2014	
5	09/04/2014	
6	09/09/2014	
7	09/11/2014	
8	09/16/2014	
9	**09/18/2014**	**MIDTERM EXAMINATION #1**
10	09/23/2014	**Chapter 3:** The Reynolds Transport Theorem. Derivation of the fluid flow equations in their integral form: conservation of mass, momentum and energy. Control volume problems.
11	09/25/2014	
12	09/30/2014	
13	10/02/2014	
14	10/07/2014	
15	10/09/2014	
16	10/14/2014	
17	10/16/2014	
18	**10/21/2014**	**MIDTERM EXAMINATION #2**
19	10/23/2014	**Chapter 4:** Derivation of the flow equations in the differential form. The Navier-Stokes equations. The Bernoulli's principle. Stream function. Vorticity and irrotationality. Review of some exact solutions for incompressible viscous flows.
20	10/28/2014	
21	10/30/2014	
22	11/04/2014	
23	11/06/2014	**Chapter 5:** Elements of dimensional analysis.
24	11/11/2014	
25	11/13/2014	**Chapter 8:** Potential flow. Simple potential functions of uniform stream, source and sink, vortex. Superposition of the solutions: flow past closed-body shapes. The Kutta-Joukowski lift theorem. Finite wing theory.
26	11/18/2014	
27	11/20/2014	
28	11/25/2014	
29	11/27/2014	
30	12/02/2014	
FINALS WEEK	**TBD**	**FINAL EXAM**

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Fabrizio Vergine.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911.